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Climate change and meat eating: An inconvenient couple?

Joop de Boer*
Hanna Schösler
Jan J. Boersema

Institute for Environmental Studies, VU University, Amsterdam

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* Address for correspondence:
Joop de Boer, PhD
Institute for Environmental Studies
VU University
De Boelelaan 1087
1081 HV Amsterdam
The Netherlands
E-mail: joop.de.boer@ivm.falw.vu.nl
Fax: +31 20 5989553
Phone: +31 20 5989555

Abstract

This paper addresses the relationship between meat eating and climate change focusing on motivational explanations of environmentally-relevant consumer behavior. Based on a sample of 1,083 Dutch consumers, it examines their responses to the idea that they can make a big difference to nature and climate protection by choosing one or more meals without meat every week. This idea can be seen as a new opportunity to help mitigation, but also as a counterproductive message that might trigger negative responses among consumers who are skeptical about climate change. As hypothesized, the meat-free meal idea was received more positively by consumers who valued care for nature and more negatively by those who did not value it. Also as hypothesized, the meat-free meal idea was received more negatively by consumers who were skeptical about the seriousness of climate change. The idea was not received more positively by those who did take it seriously. The results support the notion that the meat-free meal idea may serve as a counterproductive message. From the perspective of motivation, it is preferable not to isolate the meat-climate issue but to develop an approach that combines multiple values regarding food choices, including health and nature-related values.

Highlights

- Presents consumers' view on the links between agriculture and climate change.
- Consumers were asked about meat eating, valuing nature and climate change.
- Valuing care for nature was associated with being low on meat consumption.
- Skepticism about climate change was not conducive to a change in meat eating.
- It might be better to combine the meat-free meal idea with multiple values.

Climate change and meat eating: An inconvenient couple?

1. Introduction

Promoting changes in the Western diet from meat eating toward more plant-based foods is considered an interesting and little explored option for mitigating climate change (Carlsson-Kanyama & González, 2011; Gerber, Key, Portet, & Steinfeld, 2011; Popp, Lotze-Campen, & Bodirsky, 2011; Stehfest et al., 2009; Steinfeld et al., 2006). A recent study estimates that global livestock production is responsible for around 12% of global greenhouse gas emissions (Westhoek et al., 2011). This is due to a number of factors, mainly emissions from animals and manure, the cultivation and fertilization of feed crops and pasture, land-use changes, such as deforestation and grassland conversion, and emissions caused by the production of inputs (such as fertilizers), transporting and processing. These pressures have been caused by the massive growth of industrialized animal production during the 20th century, which made animals rather than bread the chief source of protein in Western countries (Grigg, 1995; 1999). As many people in developing countries use their growing income to follow this trend, a continued growth of both world population and per capita income may require a doubling of animal production by 2050 (Steinfeld et al., 2006).

Against this background, Stehfest et al. (2009) estimate that a global transition toward low-meat diets may reduce the costs of climate change mitigation by as much as 50% in 2050. This transition is also likely to yield additional benefits, especially for public health, because livestock products are not only a source of some essential nutrients but also provide large amounts of saturated fat, which is a known risk factor for cardiovascular disease (Friel et al., 2009). In Western countries such as the Netherlands,

the transition requires a partial replacement of animal proteins by plant proteins, which is, however, expected to encounter resistance from consumers (Friel et al., 2009; MacMillan & Middleton, 2010). Although dairy products are also important (Risku-Norja, Kurppa, & Helenius, 2009), we decided to focus this research on the question of how consumers will respond to the idea of eating less meat for mitigating climate change. The present paper aims to explore this question using a nationwide sample of consumers in the Netherlands, where meat consumption has been stabilizing around 87 kg (meat with bones) per capita per year (Product Boards for Livestock, 2003). Theoretically, our exploration focuses on several key motivational processes that may explain how meat choices might be affected by personal values related to nature and climate change.

1.1 Meat eating and values

Recent work on the relationship between meat eating and values has shown that the value "universalism", and in particular its subset of nature-related values, is significantly correlated with vegetarianism (Kalof, Dietz, Stern, & Guagnano, 1999) and, among non-vegetarians, with a low level of meat consumption (de Boer & Aiking, 2011; de Boer, Hoogland, & Boersema, 2007). This correlation refers to the universalism values from Schwartz's Value Survey (Schwartz, 1992) and the Portrait Value Questionnaire (PVQ, see Schwartz et al., 2001), which can be separated into a subset of social justice values and a subset of environmental values (Schwartz & Boehnke, 2004). The latter can be interpreted in terms of care for nature and the welfare of animals (de Boer et al., 2007). To explain how meat choices can be affected by these values, it is important to consider the underlying motivations. As Kasser (2002) notes from the perspective of Self-Determination Theory (SDT), a special feature of universalism values is that they

are closely related with a person's needs to integrate experience (see also Ryan & Deci, 2000). That is, when an activity becomes important to us, we want to bring its value-related aspects into congruence with our main values and this can be a reason to change the activity. An activity may, for instance, gain importance due to the person's awareness of its environmental consequences, as Stern and his colleagues propose in the Value-Belief-Norm (VBN) theory (Stern, 2000; 2011).

The reason why the consequences of meat eating have gained importance to many non-vegetarian consumers seems to be dissatisfaction with the industrial way of meat production that is common nowadays. The production process involves a chain of industrial activities, including factory farming, which produce highly standardized meat products, typically sold by supermarkets in a way that avoids reminding customers about the link between the meat dish and the killing of an animal (Vialles, 1994). An experimental study among consumers in the Netherlands demonstrated that reminders of meat's animal origin (made salient via a priming procedure) activated the intentions of those consumers who endorse universalism to purchase their meat from an animal-friendly production system (Hoogland, de Boer, & Boersema, 2005). Similarly, an experiment with on-package labeling showed that those consumers who endorsed universalism values had a higher intention to buy the explicitly animal friendly product (Hoogland, de Boer, & Boersema, 2007). Hence, the endorsement of universalism values implies a move away from associations with industrialized meat production, which supplies the bulk of the market. If these consumers make food choices by evaluating the fit between their personal values and the symbolic meaning of meat, they may decrease their preferences for meat (Allen & Baines, 2002; de Boer, Boersema, & Aiking, 2009;

de Boer et al., 2007). Meat reduction may be one of their acceptable options, because it fits well with health-related concerns about food and the growing appreciation of vegetarian meals, also among nutritionists (Sabaté, Duk, & Lee, 1999).

1.2 Nature and climate change

The way in which climate change may contribute to the relationship between meat choices and valuing care for nature depends on the perceived connections between nature and climate. Both psychologically and physically, this is somewhat complicated. The basics are that climate is part of nature and that climate change is a natural process, which occurs over a wide range of space and time scales. Complex societies have always been highly vulnerable to climatic stressors and these were attributed to unspecified forces grander than humans (Huber & Pedersen, 1997; Pfister, 2007). The main reason for the current concern about climate change is the anthropogenic contribution to this process. However, Donner (2007) argues that the traditional beliefs about the climate make it still difficult for people to fully accept the basic notion of human-induced climate change. This may be a breeding ground for the development of skeptical beliefs, as recorded by many public opinion surveys (see, e.g. Bord, Fisher, & O'Connor, 1998; Feinberg & Willer, 2011; Heath & Gifford, 2006; Leiserowitz, 2005; Poortinga, Spence, Whitmarsh, Capstick, & Pidgeon, 2011; Whitmarsh, 2011). Those people who do accept the notion may want to avoid major human caused climate change in order to, among other things, protect nature for future generations (Read, Bostrom, Morgan, Fischhoff, & Smuts, 1994; Reynolds, Bostrom, Read, & Morgan, 2010). Because nature is also severely threatened by non-climate related anthropogenic stressors (Rockström et al., 2009), nature protection and climate protection may be seen as separate activities that can go hand in hand or

conflict with each other. For non-experts, however, that becomes much too complicated (Bostrom et al., 2012; Read et al., 1994; Reynolds et al., 2010).

This brief analysis shows that for the purpose of this paper it will be important to consider the motivational differences between valuing care for nature and value-laden perceptions of human-induced climate change. SDT's emphasis on the need for integration (Ryan & Deci, 2000) may explain that people who are concerned about different environmental threats tend to combine various kinds of issues, such as biodiversity loss and climate change, in a holistic package that addresses all aspects of humankind's disturbed relationship with nature (see Kempton, Boster, & Hartley, 1995). Hence, it may be expected that consumers who endorse universalism values will also take the prevention of climate change more seriously. The work of Heath and Gifford (2006) provides support for this notion. Using a subtle motivational approach in a Canadian community sample, Heath and Gifford (2006) show that individuals who value nature for its own sake were more likely to believe that climate change is real and had stronger intentions to undertake mitigation actions.

In contrast, individuals who do not value nature for its own sake were less likely to believe that climate change is real (Heath & Gifford, 2006). Moreover, the study shows that skepticism about the existence, the causes and the seriousness of climate change was strongly related to a lack of interest in environmental issues and the belief that environmental issues have been exaggerated. Importantly, skepticism was not just negatively correlated with caring for the environment but also strongly positively correlated with support for a free market ideology. Hence, although nature and climate change have many things in common, people tend nowadays to become ideologically

polarized in their beliefs about climate change (see also Kahan, Jenkins-Smith, & Braman, 2011). In this context, it has been shown that overly dire messages about climate change can backfire with some individuals (Feinberg & Willer, 2011). In terms of SDT (Lavergne, Sharp, Pelletier, & Holtby, 2010), skeptics may feel particularly pressured by the supporters of climate change prevention and this perceived external pressure might explain their high levels of resistance to the notion of prevention. Under these conditions, public appeals designed to help the mitigation process may in fact be counterproductive.

1.3 Meat eating and climate change

The option of eating less meat for mitigating climate change can be seen as a relatively easy opportunity to help the mitigation process. For people in Western countries, there are many viable alternatives such as meat replacers or vegetarian food items that they can use to prepare their meals (McGee, 2004; Sadler, 2004). This may be especially attractive to individuals who care about nature and take climate change seriously, but who face significant barriers when they want to integrate their activities within their core values (Gifford, 2011; Whitmarsh, 2009; Whitmarsh & O'Neill, 2010; Wolf & Moser, 2011). Although the option of eating less meat may be seen as a welcome opportunity, several authors expect resistance from consumers (Friel et al., 2009; MacMillan & Middleton, 2010). For instance, a public call to cut meat consumption might backfire with consumers who combine a preference for meat with a skeptical opinion on climate change.

How consumers will respond is not yet clear. Until now the relationship between climate change and agriculture may not have been very salient to the general public. Some indications of public perceptions can be extracted from surveys in several

European countries and the USA (Bostrom et al., 2012; European Commission, 2010; Read et al., 1994; Reynolds et al., 2010). The results do not indicate that people feel that agriculture is to blame for climate change (European Commission, 2010, p. 57). In response to a number of opinion statements, a small proportion (29 %) agreed with the statement “Agriculture is one of the major causes of climate change”. However, there was a great deal of concern that damage is occurring in the opposite direction: a majority of the respondents (77 %) agreed with the statement “In the coming years, agriculture will suffer strongly from the effects of climate change”. This statement may generate less skepticism, because it is generally known that weather is especially important in the agrarian sector (Behringer, 1999). Some surveys in the USA also indicate that many participants expected serious consequences of climate change for agriculture but that they did not perceive agriculture as one of the major causes (Bostrom et al., 2012; Read et al., 1994; Reynolds et al., 2010). In a multinational study among business students “livestock production” was perceived as a much less important cause of climate change than "people driving their cars" (Bostrom et al., 2012).

Because none of the surveys included questions on meat consumption, there is no information on how consumers respond, in this context, to the option of eating less meat. Yet, an interesting result has recently been obtained in a survey of pro-environmental behaviors and concerns about climate change amongst the UK public (Whitmarsh & O'Neill, 2010). One of the items for measuring behavior referred to the frequency of the action “avoid eating meat” and this item was one of the four that formed an “eco-shopping and eating” component in a principal component analysis. It is noteworthy that the only significant predictors of this component in a multiple regression analysis were

pro-environmental identity (e.g. thinking of oneself as an environmentally-friendly consumer) and a high level of education. This agrees with the above mentioned results. Remarkably, the four different measures of concern about climate change in terms of self-assessed knowledge, belief about causes, personal importance, and perceived risk had no significant influence on the "eco-shopping and eating" component. However, because the study did not focus on the relationship between climate change and meat consumption, it is not clear whether consumers saw any connection between these topics.

1.4 The present study

The aim of the present study is to explore, in a straightforward manner, how consumers respond to the idea of eating less meat for mitigating climate change, taking into account how often they eat meat at their main meal, how much they value nature and how they perceive climate issues. This approach was chosen because it builds on our earlier work about the impacts of meat consumption on food sustainability (e.g., de Boer & Aiking, 2011; de Boer et al., 2007; de Boer et al., 2009) and valuing care for nature (de Boer, 2010). We expected to replicate the results reported by Heath and Gifford (2006) that the value of care for nature is negatively correlated with skepticism about the seriousness of climate change. In addition, our first hypothesis aims to replicate the finding of a negative correlation between the frequency of meat consumption and the value of care for nature. As mentioned above, consumers in the Netherlands may clearly associate animal welfare and nature protection with eating less meat.

The central part of the next two hypotheses is the idea that an individual can make a big difference to nature and climate protection by choosing one or more meals without meat every week. Both nature and climate protection were mentioned in the meat-free

meal idea, because they are often named together. No reference was made to specific initiatives, such as “Meatless Monday” (e.g., Parker, 2011). The second hypothesis postulates that the meat-free meal idea will be received more positively by consumers who value care for nature and more negatively by those who do not value it. And finally, the third hypothesis is that the meat-free meal idea will be received more negatively by consumers who are skeptical about the seriousness of climate change and more positively by those who do take it seriously, independently of whether they value care for nature. The hypothesis does not predict a backfire effect of the meat-free meal idea, but leaves the issue open.

2. Method

2.1. Participants

The data set is based on a nationwide sample of 1,083 consumers in the Netherlands. The very high degree of Internet penetration in this country (about 93% of the population) enabled a survey via a market research firm among consumers with Internet access. The stratified sample was drawn from a large panel of persons who were willing to participate in web-based research for a small reward, which they can keep for themselves or donate to charity.

2.2. Procedure

In November 2010 the participants (response rate 68%) answered questions about food. Due to the stratified sampling procedure, the data showed a representative distribution of the main demographic characteristics (see Table 1), although young men were slightly less likely than young women to participate. Building on earlier research on food choices (de Boer & Aiking, 2011; de Boer et al., 2007; de Boer et al., 2009), the questionnaire included modules with questions about meat (where "meat" does not include fish), attitudes towards meat products, food choice motives, basic human values (including the value of care for nature), and some household characteristics. In the present paper, we use from these modules the questions on the frequency of meat eating, the value of care for nature, and some demographics. The final part of the questionnaire contained five attitude statements on climate change and its relationship to agriculture, as well as the questions on the meat-free meal idea.

2.3. Measures

2.3.1. Frequency of meat consumption

The frequency of meat consumption was measured by a single question “How many days per week do you eat your main meal with meat (including chicken)?” This question had been used in earlier research on food choices (de Boer et al., 2007).

2.3.1. Value of care for nature

The degree to which the participants valued care for nature was measured by two nature-related items from the 40 item Portrait Value Questionnaire (PVQ, see Schwartz et al., 2001). In the PVQ each portrait consists of two sentences describing a person in terms of a value that is important to him or her. Participants were asked to compare the portrait to themselves and to rate on a 7-point scale “how much like you” the person is (i.e. 1 = not like me at all, 7 = very much like me). The female versions of the items related to nature are: “She strongly believes that people should care for nature. Looking after the environment is important to her” (M = 4.16, SD = 1.56) and “It is important to her to adapt to nature and to fit into it. She believes that people should not change nature” (M = 3.67, SD = 1.62). To assess the relative priority the participants gave to nature, their mean rating over all the portraits was subtracted from their score on each nature-related item, as advised by Schwartz (2001) to correct for individual differences in mean response to this type of items. After this centering procedure Cronbach’s alpha for the two items was .66. Although it is a two-item scale, its strength has been demonstrated in research on food choices (de Boer & Aiking, 2011) and judgments on biotechnology (de Boer, 2010).

2.3.2. Attitudes on climate change and its relationship to agriculture

To gain insight into the generalizability of the participants’ opinions on climate change, we used a number of questions from Eurobarometer surveys, which enable the European Union to monitor the evolution of the public opinion in its member states. Two

of the five attitude statements on climate change were adapted from Eurobarometer 72.1 (European Commission, 2009). These negatively worded items were “The seriousness of climate change has been exaggerated” and “Climate change is an unstoppable process, we cannot do anything about it”. The three others were adapted from Eurobarometer 72.5 (European Commission, 2010) and slightly reworded in order to refer to “agriculture and animal husbandry” instead of just “agriculture”. The reason is that the Dutch word for agriculture (“landbouw”) may be interpreted in a way that does not include both crops and animals. The items were “Agriculture and animal husbandry together are one of the major causes of climate change”, “In the coming years, agriculture and animal husbandry will suffer strongly from the effects of climate change”, and “If agriculture and animal husbandry change the way they work, they can counter climate change”.

The answers to the items were fully in agreement with the results of the European surveys in the Netherlands a year earlier (European Commission, 2009; 2010). For example, 40% of the participants endorsed the item that the seriousness of climate change has been exaggerated (see Table 2). The participants who disagreed with this skeptical statement agreed more often with statements that recognize the bidirectional relationship between climate change and the agricultural sector. Mentioning the combination of agriculture and animal husbandry did not make a notable difference. As in the earlier survey, agriculture was seen primarily as a sector that is negatively affected by climate change (51%) rather than one that is a major cause of climate change (23%). The statement that agriculture and animal husbandry can counter climate change by changing the way they work was approved by 38%. The answers to the five items, on a scale varying from 1 (fully agree) to 7 (fully disagree), were analyzed with a principal

components analysis. The factor score of the first unrotated component was used as a five-item measure of skepticism (see Table 2, explained variance 42%, eigenvalue 2.10, Cronbach's alpha of the component .65). The second component had a high loading for the item dealing with climate change as an unstoppable process and an eigenvalue of 1.18, which is too low for a reliable analysis. Overall, the multi-item scale differentiated participants who were skeptical about the seriousness of climate change (negative loading item) from those who took it seriously and acknowledged that it affects food production and vice versa (positive loading items). As expected, skepticism about the seriousness of climate change was negatively correlated with the value of care for nature ($r = -.20$, $p < .001$).

2.3.3. Meat-free meal idea

The participants were asked whether they were familiar with the idea that an individual can make a big difference to nature and climate protection by choosing one (or more) meals without meat every week (possible answers "Yes" and "No"). Next, they were asked whether they were willing to do that. The answer alternatives were, 1 "Certainly", 2 "Maybe", 3 "I am already doing that", and 4 "No, I don't want to do that".

2.4 Analysis

By performing a multinomial logistic regression, it was determined how much the responses to the meat-free meal idea were associated with its familiarity, the frequency of meat consumption, the value of care for nature and skepticism about climate change. To control for correlations with background variables, we included gender, age and level of education in the analysis.

3. Results

Our first hypothesis postulated a negative correlation between the frequency of meat consumption and endorsing the value of care for nature. The frequency of meat as the main meal was measured in number of days per week. On average, the participants reported a number of 5.4 meat days per week (the median was 6). Eating meat every day was reported by 28% and 23% answered they did not eat meat more than 4 days a week. Despite these differences, almost all the participants were meat consumers and the number of vegetarians was low (1.2%). As Table 3 shows, a lower frequency of meat consumption went together with a higher value attributed to care for nature (r = -.21, p < .001).

The next two hypotheses concern the responses to the idea that an individual can make a big difference to nature and climate protection by choosing one or more meals without meat every week. The question that asked the participants whether they were familiar with the idea was answered positively by 64%. The correlations in Table 3 show that familiarity with the idea was somewhat higher among people with a higher level of care for nature (r = .20 p < .001) and with higher age and education level (r = .18, and r = .18, p < .001). When asked about their willingness to choose a meal without meat 15% answered certainly, 41% maybe, 21% said they do it already and 23% said that they don't want to change. The results of the multinomial logistic regression models, presented in Table 4, revealed that familiarity with the meat-free idea and a low frequency of meat consumption significantly differentiated both the group who certainly wanted to change and the group who said they do it already from the participants who said maybe or no. According to the second hypothesis, the meat-free meal idea will be received more

positively by consumers who value care for nature and more negatively by those who do not value it. As Table 4 demonstrates, a unit increase in valuing care for nature (e.g., one standard deviation) was associated with an increase of the odds of certainly wanting to change (54%) and a decrease of the odds of not wanting to change (46%), in comparison with the maybe-group. This finding agrees with the hypothesis.

The third hypothesis predicted that the meat-free meal idea will be received more negatively by consumers who are skeptical about the seriousness of climate change and more positively by those who do take it seriously, independently of whether they value care for nature. Table 4 shows that in comparison with the maybe-group a unit increase in skepticism about climate change (e.g., one standard deviation) was associated with almost a doubling of the odds of not wanting to change (98%), partially supporting the fourth hypothesis. However, a decrease in skepticism was not significantly associated with the odds of certainly wanting to change. This result was not affected by performing the analysis without the variables valuing care for nature or familiarity with meat-free idea (analysis not shown). Hence, the meat-free meal idea was not received more positively by consumers who took climate change seriously.

Additionally, there were small differences between males and females (who more often agreed). Age did not significantly contribute to the prediction of the groups and level of education had a marginal influence. The overall model resulted in a Nagelkerke pseudo R^2 of .36 (Chi- square = 435.18, $df = 21$, $p < .001$). The difference in likelihoods between the final model and a reduced model was larger for skepticism about climate change (Chi square = 69.65, $df = 3$, $p < .001$) than for valuing care for nature (Chi square = 51.35, $df = 3$, $p < .001$).

4. Discussion

Changing meat-eating habits may be seen as a relatively cheap and easy way to mitigate climate change, in contrast to many other climate mitigation behaviors, which are seriously constrained by external factors (Whitmarsh & O'Neill, 2010). In exploring this issue, we have taken into account that the option of eating less meat can be seen, on the one hand, as a new opportunity to help mitigation, but, on the other hand, as a counterproductive proposal that might trigger negative responses among consumers who are skeptical about climate change. The notion of a new opportunity means that the prevention of climate change may add an additional element to the environmental reasons for eating less meat that already seem to motivate consumers who value care for nature. Our measure of climate change attitude differentiated those consumers who were skeptical about the seriousness of climate change from those who acknowledged its great significance for the agricultural sector. The results replicated the finding by Heath and Gifford (2006) of a negative correlation between the value of care for nature and skepticism about the seriousness of climate change and the finding by de Boer and Aiking (2011) of a negative correlation between the value of care for nature and the frequency of meat consumption.

Using a correlational design, we examined consumers' responses to the idea that they can make a big difference to nature and climate protection by choosing one or more meals without meat every week. As hypothesized, the meat-free meal idea was received more positively by consumers who valued care for nature and more negatively by those who did not value it. Also as hypothesized, the meat-free meal idea was received more negatively by consumers who were skeptical about the seriousness of climate change,

independently of whether they valued care for nature. In contrast, however, consumers who took climate change seriously did not significantly respond more positively to the idea.

4.1 Motivational explanations

Our findings add to the idea that people's choices in the areas of food and environment can be better understood by exploring their underlying motivations. SDT's work on tendencies toward integrating value-relevant aspects of particular activities within one's core values can explain how valuing care for nature may be related to a low consumption of meat and the willingness to accept the meat-free meal idea. The findings suggest that a significant number of consumers was internally motivated to change their behavior in a responsible direction. In line with this motivation, they may have the experience that it is meaningful what they are doing, rather than seeing their behavior in terms of "self-sacrifice".

However, the participants who took climate change seriously did not seem to recognize the option of eating less meat as a significant opportunity for helping the mitigation process. One of the reasons may be that the connection between meat eating and climate change is too vague and too complicated to increase people's sense of urgency. A lack of urgency to address climate change is a general problem, as many psychologists who have tried to characterize the public's response have noted (Gifford, 2011; Reynolds et al., 2010; Weber & Stern, 2011; Whitmarsh, 2009). In addition, "livestock production" may be perceived as a much less important cause of climate change than "people driving their cars" (Bostrom et al., 2012).

Another reason for this finding may be that our measure of climate change attitude was not personalized enough to reveal subtle differences in motivation. Believing that the seriousness of the issue has been exaggerated stands at one pole of the scale in opposition to agreement with statements about cause, effect and solution at the other. Agreeing with these statements acknowledges that climate change negatively affects food production and vice versa. The answers to the items were fully in line with the results of earlier surveys (European Commission, 2009; 2010). These results may mean that, in the eyes of the consumers, it is the agricultural sector that has a problem with climate change, not they. The statements were less personally relevant than the items on valuing care for nature, which were taken from Schwartz's Portrait Value Questionnaire (Schwartz et al., 2001). Further research could reveal whether a more personalized approach in terms of care for climate will identify additional reasons for eating less meat beyond the reasons that already appear to motivate consumers who value care for nature.

At the opposite side of the scale, our results also underline the significance of a motivational analysis for a better understanding of climate change skeptics. The data suggest that the meat-free meal idea may serve as a counterproductive message, which triggers negative responses among consumers who are skeptical about climate change. Although the evidence is correlational, it is important to note that the degree to which they rejected the idea can be interpreted as a backfiring effect in response to unwelcome information (Chong & Druckman, 2007). Obviously, our study is not able to specify the underlying mechanism and it should be mentioned that the background of skepticism about climate change is not completely clear. Skepticism seems to be associated less with ignorance and misunderstanding on the part of the public than with values and moral

issues (Feinberg & Willer, 2011; Heath & Gifford, 2006; Kahan et al., 2011; Whitmarsh, 2011). Further research might examine whether skeptics feel particularly pressured by the supporters of climate change prevention and then test whether this perceived external pressure can explain their high levels of resistance to the meat-free meal idea.

4.2 Mitigation strategies

Our results demonstrated in several ways that eating less meat is a very much under-explored option for mitigating climate change. The fact that a large percentage of the participants answered “maybe” to the question on their willingness to choose a meal without meat indicates that many had not made up their minds. Although this can be seen as possible support for the option, it is important for mitigation strategies not just to wait for an internally motivated, prevention oriented change and to develop a complementary approach. However, a crucial theme in SDT is that such an approach should take into account how social forces influence motivation (Lavergne et al., 2010). Contextual factors perceived by consumers as external pressure on their own judgment are expected to lead to negative impacts on their motivation. In contrast, a positive contribution may be expected from contextual factors that are perceived to support socially valued alternative behaviors.

Creating socially valued alternatives may start with challenging taken-for-granted expectations about the position of meat as a dominant part of the meal (Douglas, 1972; Schösler, de Boer, & Boersema, 2012). In fact, it is the meal and not the meat as such that has to be the primary focus of efforts to change. In Western countries, it is the routinized pattern of meat consumption that accounts for its sheer volume. The emerging literature on this topic already suggests various ways to get consumers out of routinized meat

eating and enable a shift towards more plant based options (Schösler et al., 2012; Wansink, 2002), for example, by the substitution of meat in convenience products (e.g., pizzas), where meat as an ingredient is already less visible and the substitute can be appropriately combined with the meal (Elzerman, Hoek, van Boekel, & Luning, 2011). Importantly, such a mitigation strategy should not give the impression to consumers that climate change campaigners want them to become vegetarians for environmental reasons.

4.3 Communication strategies

Clearly, further research is needed to specify how positive and negative responses to the meat-free meal idea can be predicted. Our rather straightforward approach did not pay attention to differences in framing and communication strategies that may be applied to engage people with different types of motivation (Gifford & Comeau, 2011; Nisbet, 2009; Moser, 2010). The various ways to frame the message may put an emphasis on meat, climate or nature. Our study suggests that an emphasis on the meat-climate issue is not very promising. Consumers who took climate change seriously did not significantly respond positively and the skeptics were negative. The connection between meat eating and climate change may also be too vague and too complicated to fit well into public communication campaigns that aim to inform consumers how they can act to promote a low carbon society, as pioneered by the UK (Whitmarsh, Seyfang, & O'Neill, 2011).

Instead of emphasizing the relationship between meat, carbon and climate change, it may be preferable to take a motivational perspective and to explore meaningful connections between value-related aspects of meat eating. Various campaigns to reduce meat consumption, such as Meatless Monday, have been primarily developed for public health reasons (Parker, 2011). Such a strategy can be further extended to support multiple

values regarding food choices, such as food safety and authenticity, as well as care for animal welfare and nature (de Boer et al., 2007). This approach should avoid associations with “self-sacrifice” that appear to be less appealing (Gifford & Comeau, 2011) but give consumers the experience of “feeling right” about what they are doing. From the perspective of motivation, therefore, it is preferable not to isolate the meat-climate issue.

4.4 Limitations

A limitation of our exploratory study is that we used a simple correlational approach, which does not allow us to shed more light on the psychological processes that underlie consumer responses to the meat-free meal idea. We used several single-item and two-item measures and that is not satisfactory from a scientific point of view, although most of these measures were taken from other research. The rather general attitude statements on climate change and agriculture should be supplemented by more specific beliefs about various linkages between meat eating and environmental pressure. A further limitation is that this study is based on single country data, i.e. on consumers in the Netherlands. Generalization of the findings to the broader population may be limited by the characteristics of the sample, the sampling method and the geographical scope of the study. Despite these limitations, we hope that our work will serve as a stimulus for further investigation of this emerging field.

5. Conclusion

The relationship between meat eating and climate change is an important topic for researchers and policy-makers. For researchers it is important, because the very idea of eating less meat to mitigate climate change may give rise to complex motivational processes among consumers. For policymakers in government, industry and non-governmental organizations the topic is important, because changing meat-eating habits may not only be seen as a relatively cheap and easy way to mitigate climate change, but also as an approach that can encounter resistance from consumers. Our findings show that simple calls to eat less meat may prove to be counterproductive. Because resistance is likely to undermine any efforts to engage the public with climate change, policymakers should not push consumers to accept the connection between meat eating and climate change. Instead of isolating the meat-climate issue, it is preferable to develop an approach that combines multiple values regarding food choices, including health and nature-related values. Taking into account how social forces influence motivation, a positive contribution may be expected from addressing contextual factors so that a meal without meat may become a more socially valued alternative.

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Table 1

Main demographic characteristics of the participants.

Variable	Levels	No	%
Gender	Male	542	50
	Female	541	50
Age	18-34	221	20
	35-54	434	40
	55-74	365	34
	75 and over	63	6
Education level	Primary education	68	6
	Preparatory vocational education	193	18
	Lower general secondary education	123	11
	Intermediate vocational education	323	30
	Higher general secondary education/ preparatory university education	98	9
	Higher vocational education	175	16
	University education	95	9
	Unknown	7	1

Table 2

Attitude statements on climate change and its relationship with agriculture.

Items	Mean	SD	Factor loading[a]	Percentage of endorsement[b]			
				Agree	Middle	Disagree	Sum
The seriousness of climate change has been exaggerated.	3.87	1.69	-.61	40%	28%	32%	100%
Climate change is an unstoppable process, we cannot do anything about it.	4.25	1.65	-.35	31%	26%	43%	100%
Agriculture and animal husbandry together are one of the major causes of climate change.	4.36	1.46	.71	23%	36%	41%	100%
In the coming years, agriculture and animal husbandry will suffer strongly from the effects of climate change.	3.46	1.31	.67	51%	34%	15%	100%
If agriculture and animal husbandry change the way they work, they can counter climate change.	3.83	1.46	.81	38%	37%	25%	100%

[a] Principal component analysis, one component solution, accounting for 42% of variance.

[b] Answers were contracted from a 7-point scale, agree (1, 2, 3), middle (4), disagree (5, 6, 7).

Table 3

Correlations between the predictor variables.

	1	2	3	4	5	6	7
1. Frequency of meat consumption	–						
2. Value of care for nature	-.21***	–					
3. Skepticism about climate change	.12***	-.20***	–				
4. Familiarity with meat-free idea	-.17***	.20***	-.11***	–			
5. Gender (woman)	-.04	.01	-.05	-.05	–		
6. Age	-.01	.21***	.10**	.18***	-.16***	–	
7. Level of education	-.14***	.03	-.12***	.18***	.00	-.14***	–

** $p < .01$. *** $p < .001$.

Table 4

Results of multinomial logistic regression models predicting responses to the meat-free meal idea.

	Odds Ratio		
Predictor	Certainly wants to change	Claim they do it already	Does not want to change
Familiarity with meat-free idea	3.41***	3.56***	1.14
Frequency of meat consumption	.62***	.55***	1.04
Value of care for nature	1.54***	1.31	.64***
Skepticism about climate change	.88	1.08	1.98***
Gender (woman)	2.53***	1.59*	0.81
Age	1.00	1.01	1.00
Level of education	1.04	1.08	.90*

Notes: The reference category is "Maybe" (41%); the predictors Value of care for nature and Skepticism about climate change have been standardized; Nagelkerke R square =.36.

*$p < .05$. ***$p < .001$.